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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/566,723	02/02/2006	Tatsuya Igarashi	1982-0258PUS1	9724

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EXAMINER
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HOLLWEG, THOMAS A

ART UNIT	PAPER NUMBER
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2879

NOTIFICATION DATE	DELIVERY MODE
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12/23/2008

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/566,723	<b>Applicant(s)</b> IGARASHI ET AL.	
	<b>Examiner</b> Thomas A. Hollweg	<b>Art Unit</b> 2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 15 January 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 February 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>9/5/08</u> .  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Acknowledgement of Amendment***

1. Applicant's Amendment, received September 5, 2008, is acknowledged. No claims are added or cancelled. Claims 1-15 are currently pending.
2. Applicant's arguments and Declaration submitted under 37 CFR § 1.132, have been considered. The previous prior art rejections are withdrawn.

### ***Information Disclosure Statement***

3. The information disclosure statement (IDS) submitted on September 5, 2008, is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

### ***Claim Rejections - 35 USC § 112 First Paragraph***

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1-15 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.
6. Based on the disclosure, one having ordinary skill in the art would not be able to determine the materials used for the fluorescent compound or the host in the light emitting layer to construct a device that achieves applicant's claimed external quantum

Art Unit: 2879

efficiency of 6% or more. Pages 8 to 19 of the specification provide a lengthy description of the preferred chemical formulation of the fluorescent material used in the invention. Similarly, pages 19-34 provide a lengthy description of the preferred chemical formulation of the host for the light emitting layer used in the invention. However, no reasonably specific description is given of formulations for the fluorescent material or the host material that may be used to achieve applicant's claimed affect.

7. The information given in relation to examples 1-9 is also deficient. Examples 1-9 refer to "Compound B," representing the fluorescent material used in the invention. A chemical diagram is given for the general structure of Compound B, however, no reasonably specific description is given of the materials used for Compound B. Also, the material used for the host, referred to as "Compound A" in the examples, is only given for 3 of the 9 examples. Based on the information given one skilled in the art would not be able to make or use the claimed invention, capable of achieving an external quantum efficiency that is greater than 6%, without undue or unreasonable experimentation.

### ***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claim 1-4 and 6-15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akiyama, U.S. Patent Application Publication No. 2002/0146589 A1, in view of Forrest et al., U.S. Patent No. 6,310,360 B1.

Art Unit: 2879

10. With regard to claim 1, in figure 1, Akiyama discloses an organic electroluminescent device having at least one organic layer (3, 4, 5) containing a light-emitting layer (4) between a pair of electrodes (2, 6), wherein the organic electroluminescent device contains a compound [0039] emitting fluorescence at a time that voltage is applied, and a light emission at the time that voltage is applied is mainly derived from a light emission from the fluorescent compound [0043]. Akiyama does not expressly disclose that an external quantum efficiency of the device is 6% or more.

11. Forrest and Akiyama both teach an organic EL device where the luminescent layer comprises a fluorescent material and a phosphorescent additive where energy is transferred from the phosphorescent additive to the fluorescent material to improve the light emitting efficiency of the fluorescent material (Forrest, col. 5, lines 9-13 & col. 6, line 63 - col. 7, line 9; Akiyama, [0007-0009]). Forrest and Akiyama both teach that a preferred phosphorescent additive is  $\text{Ir(ppy)}_3$  and the fluorescent material should be chosen to maximize the energy transfer between the phosphorescent additive and the fluorescent material (Forrest, col. 9, lines 2-14; Akiyama [0039]). Further, Akiyama teaches that the internal efficiency of the disclosed invention is greater than 25% (Abstract), while Forrest teaches that the internal efficiency of the fluorescent material may be as high as 100% (col. 7, lines 5-7).

12. Based on these teachings, it would be obvious to one having ordinary skill in the art to achieve the internal quantum efficiencies taught by Forrest and Akiyama by constructing the Akiyama light emitting layer with a fluorescent material is selected to fit the criteria taught by the references. Further, it would have been obvious to one having

Art Unit: 2879

ordinary skill to construct the Akiyama device with layers and materials that allows for efficient light emission from the device, so that the external quantum efficiency is 6% or more.

13. Therefore, at the time of invention, it would have been obvious for a person having ordinary skill in the art to construct the Akiyama device where an external quantum efficiency of the device is 6% or more, based on the teachings of Forrest and Akiyama, to maximize the external quantum efficiency of the device.

14. With regard to claim 2, Akiyama does not expressly disclose an organic electroluminescent device having an internal quantum efficiency of 30% or more. However, at the time of invention, it would have been obvious for a person having ordinary skill in the art to construct the Akiyama device where the internal quantum efficiency is 30% or more, based on the teachings of Forrest and Akiyama, for the same reasons discussed in the rejection of claim 1.

15. With regard to claim 3, in figure 1, Akiyama discloses that the organic electroluminescent device contains an amplifying agent [0032-0038] performing a function of amplifying a number of singlet excitons generated at the time that voltage is applied, thus amplifying an intensity of the light emission.

16. With regard to claim 4, in figure 1, Akiyama discloses that a maximum light-emitting wavelength from the compound emitting fluorescence is 580 nm or less (inherent to the disclosed compound emitting fluorescence, merocyanine 540 [0039]).

17. With regard to claim 6, in figure 1, Akiyama discloses that the compound emitting fluorescence is a fused aromatic compound [0039, 0085].

Art Unit: 2879

18. With regard to claim 7, in figure 1, Akiyama discloses that the organic electroluminescent device has an electron-transporting layer (5), and the electron-transporting layer (5) contains a non-complex compound [0051].
19. With regard to claim 8, in figure 1, Akiyama discloses that the amplifying agent is a transition metal complex [0032-0038, 0100].
20. With regard to claim 9, in figure 1, Akiyama discloses that a concentration of the amplifying agent contained in the light-emitting layer is 9 weight % or less (Table 1 showing compound ratios).
21. With regard to claim 10, in figure 1, Akiyama discloses that a difference between the maximum light-emitting wavelength of the compound emitting fluorescence ([0039] merocyanine 540) at the time that voltage is applied, and a maximum light-emitting wavelength of the amplifying agent [0082], is 70 nm or less.
22. With regard to claim 11, in figure 1, Akiyama discloses that a difference between the maximum light-emitting wavelength of the amplifying agent [0081], and an absorption maximum wavelength of the compound emitting fluorescence ([0039] merocyanine 540) at the time that voltage is applied, is -20 nm or more.
23. With regard to claim 12, in figure 1, Akiyama discloses that the organic electroluminescent device has a hole-transporting layer (3), the light-emitting layer (4) and the electron-transporting layer (5), and a light emission from the compound emitting fluorescence is 80% or more of a total light emission obtained from the organic electroluminescent device [0009, 0016, 0041-0043].

Art Unit: 2879

24. With regard to claim 13, in figure 1, Akiyama discloses that the organic electroluminescent device has the hole-transporting layer (3), the light-emitting layer (4) and the electron-transporting layer (5), and has neither a hole blocking layer nor an exciton blocking layer between the light-emitting layer (4) and the electron-transporting layer (5).

25. With regard to claim 14, in figure 1, Akiyama discloses that the organic electroluminescent device has the hole-transporting layer (3), the light-emitting layer (4) and the electron-transporting layer (5), and the light-emitting layer (4) has at least one alternately laminated structure including a layer containing at least one compound emitting fluorescence at a time that voltage is applied and a layer containing at least one amplifying agent [0040].

26. With regard to claim 15, in figure 1, Akiyama discloses all of the limitations of claim 14, including that the light-emitting layer maybe formed in separate layers, where one layer contains a compound emitting fluorescence and another layer containing an amplifying agent. However, Akiyama does not expressly disclose that the light-emitting layer has an alternately laminated structure of ten or more layers.

27. Forrest teaches an electroluminescent device with a light-emitting layer having multiple layers, one layer containing a compound emitting fluorescence and another layer containing an amplifying agent, that are arranged in an alternately laminated structure of ten or more layers (col. 13, lines 22-26).

28. At the time of invention, it would have been obvious for a person having ordinary skill in the art to construct the Akiyama device where the light-emitting layer is arranged



Art Unit: 2879

in an alternately laminated structure of ten or more layers, as taught by Forrest, because this arrangement encourages more intersystem crossing, leading to more efficient fluorescent emission.

29. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akiyama and Forrest, as applied to claim 1 above, in view of Thompson et al., U.S. Patent No. 5,861,219.

30. In figure 1, Akiyama discloses all of the limitations of claim 5, including that a light-emitting layer contains at least one host material; however, Akiyama does not expressly disclose that the host material is a complex.

31. Thompson teaches an electroluminescent device with a light-emitting layer having at least one host material, and the host material is a complex (col. 3, lines 10-35).

32. At the time of invention, it would have been obvious for a person having ordinary skill in the art to construct the Akiyama and Forrest device where the host material is a complex, as taught by Thompson. Using a host material that is a complex would allow for a high level of energy transfer between the host and luminescent material, as taught by Thompson (col. 2, lines 45-56; col. 3, lines 10-23).

### ***Double Patenting***

33. The provisional double patenting rejection of claims 1-7, over claims 15-20 of copending Application No. 11/269,809 (Igarashi, U.S. 2006/0099451 A1), explained in detail in the Office Action of March 6, 2008, remains in effect.

Art Unit: 2879

34. This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

### ***Response to Arguments***

35. Applicant's arguments and Declaration submitted under 37 CFR § 1.132, have been considered. Examiner notes that the experiment performed by applicant, to reproduce example 1 from Akiyama, does not incorporate other teachings from Akiyama that would improve the external quantum efficiency of the device. These include the use of the hole transport layer (3) and an electron transport layer (5) (shown in figure 1) that would reduce the voltage necessary to drive the device [0031]. The experiment conducted by applicant also does not take into account the teachings of Forrest which gives direction for achieving a device with an internal quantum efficiency of fluorescence of up to 100% (col. 7, 5-7).

36. While example 1 from Akiyama may not anticipate each limitation of applicant's claim 1, the combined teachings of Akiyama and Forrest render applicant's claimed invention obvious to one having ordinary skill in the art.

### ***Conclusion***

37. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas A. Hollweg whose telephone number is (571) 270-1739. The examiner can normally be reached on Monday through Friday 7:30am-5:00pm E.S.T..

Art Unit: 2879

38. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

39. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/TH/

/NIMESHKUMAR D. PATEL/

Supervisory Patent Examiner, Art Unit 2879